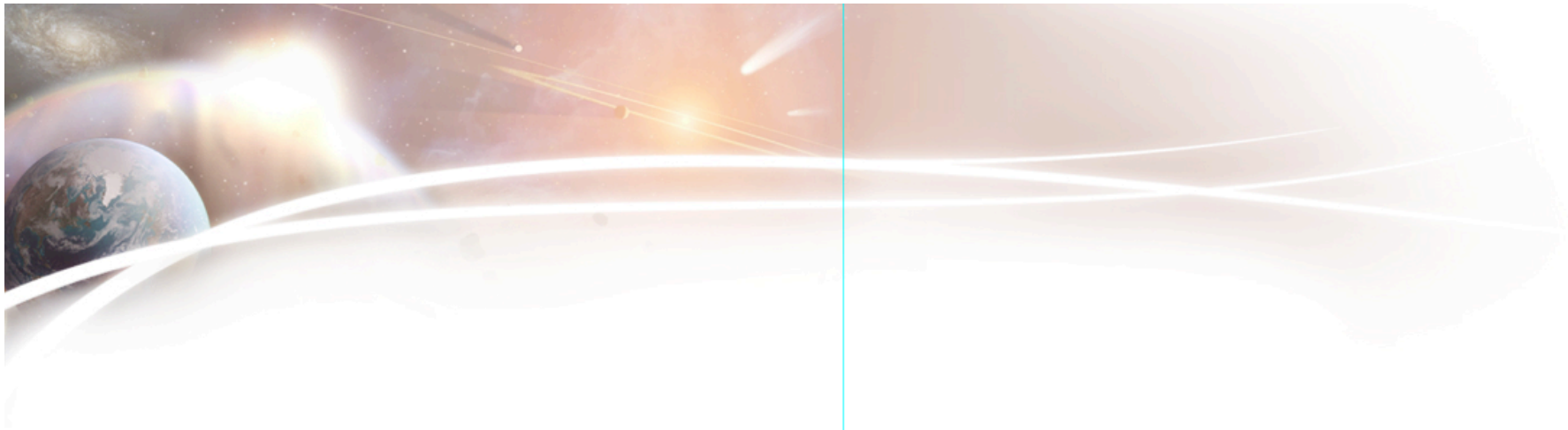

NASA SCIENCE HIGHLIGHT: Science Mission Directorate (SMD)

February 23, 2011

NASA Science Highlight: Planetary Program Support

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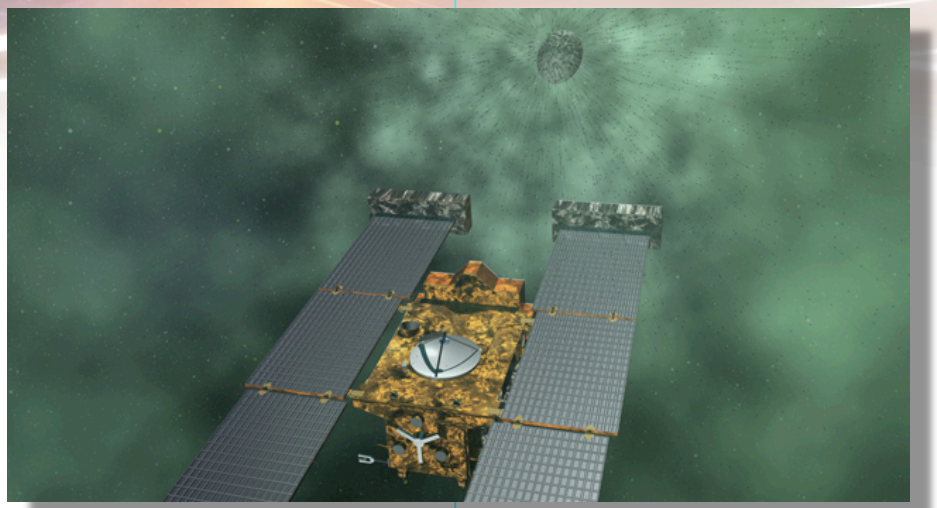
Stardust-NExT Mission Delivers Striking Images of Man-Made Crater on Comet Tempel 1



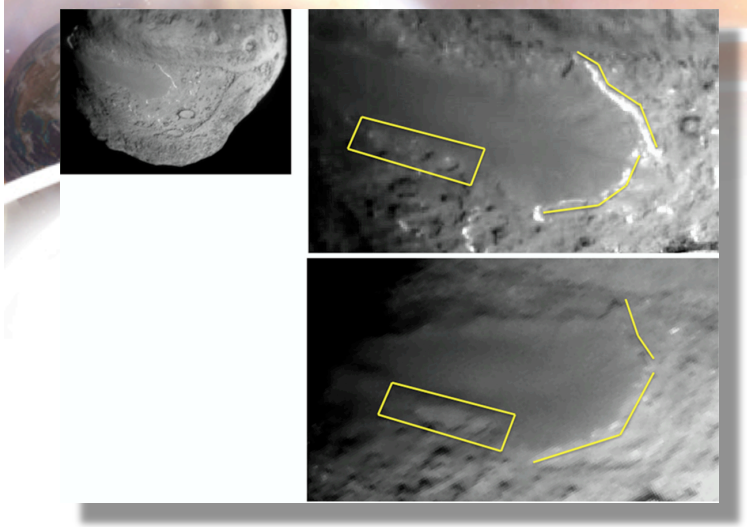
Artist's concept of NASA's Stardust-NExT mission, which flew by Comet Tempel 1 on Feb. 14, 2011. Image credit: NASA/JPL-Caltech/LMSS

On January 15, 2006, the Stardust spacecraft completed one history-making mission and began another. Returning from a rendezvous with Comet Wild 2, the spacecraft approached Earth and jettisoned the capsule containing particles collected directly from the comet, as well as the interstellar dust medium. The capsule landed safely and on-target southwest of Salt Lake City, Utah, completing the world's first sample return from a comet.

Then, on February 14, 2011, the spacecraft, on its second mission of exploration called Stardust-NExT, visited Comet Tempel 1-- the comet previously targeted by the Deep Impact mission, making it the first-ever follow-up mission to a comet.

The spacecraft made its closest approach to Comet Tempel 1 on Monday, Feb. 14, at 8:40 p.m. PST (11:40 p.m. EST) at a distance of approximately 178 kilometers (111 miles). Stardust took 72 high-resolution images of the comet. It also accumulated 468 kilobytes of data about the dust in its coma, the cloud that is a comet's atmosphere.

Stardust-NExT Mission Delivers Striking Images of Man-Made Crater on Comet Tempel 1



This image at left layout depicts changes in the surface of comet Tempel 1, observed first by NASA's Deep Impact Mission in 2005 (top right) and again by NASA's Stardust-NExT mission on Feb. 14, 2011 (bottom right). Between the two visits, the comet made one trip around the sun. The image at top left is a wider shot from Deep Impact. The image mosaic at top right shows four different views of Comet Tempel 1 as seen by Stardust-NExT as it flew by on February 14, 2011.

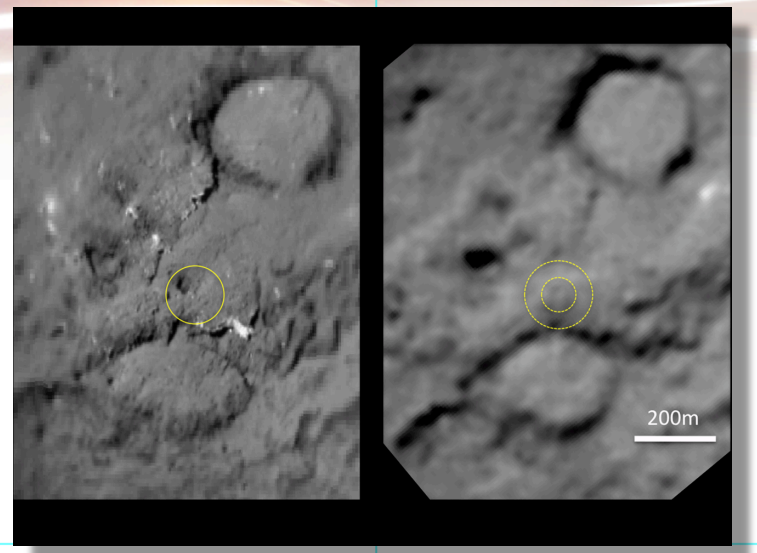
The Stardust-NExT mission met its goals, which included observing surface features that changed in areas previously seen during the 2005 Deep Impact mission; imaging new terrain; and viewing the crater generated when the 2005 mission propelled an impactor at the comet.

Several of the images provide clues to the result of the Deep Impact mission's collision with Tempel 1.

Observations included a crater with a small mound in the center, indicating that some of the ejecta from Deep Impact went up and came right back down, meaning that the cometary nucleus is fragile and weak, with particles exploding from the surface in large chunks that crumbled, rather than a little stream of uniform particles ejecting from the impact crater.

Engineering telemetry downlinked after closest approach indicates the spacecraft flew through waves of disintegrating cometary particles, including a dozen impacts that penetrated more than one layer of its protective shielding.

Stardust-NExT Mission Delivers Striking Images of Man-Made Crater on Comet Tempel 1



This pair of images shows the area affected by the impactor released by NASA's Deep Impact spacecraft in July 2005. On the left, the image from Deep Impact shows a dark mound about 50 meters (160 feet) in size. It is inside a yellow circle that shows the area hit by the impactor released by Deep Impact. Image credit: NASA/JPL-Caltech/ University of Maryland/Cornell

Implications:

The Stardust-NExT mission contributes greatly to understanding comets by capitalizing on missions such as Deep Impact to determine how cometary nuclei were constructed at the birth of the solar system and increase our understanding of how they have evolved since then. The mission also provides NASA with the unique opportunity to study two entirely different comets with the same instrument. By doing this scientists will be able to more accurately compare its existing data set.

Significance to Solar System Exploration:

Comets offer clues to the composition and processes that formed the giant planets in the outer solar system. For example, some of the particles gleaned from the Stardust mission were formed at very high temperatures near the sun and yet comets formed in the cold outer regions of our solar system so there was apparently significant material flows from the inner to the outer solar system during its formation process.